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AGRICULTURAL RESEARCH MANAGEMENT TRAINING NEEDS IN SADCC

BY

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Working Paper AEE 5/91

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1. INTRODUCTION

Management capabilities in agricultural research have been diagnosed as extremely weak in East and Southern Africa. Many agricultural professionals including academics are involved in management but have not had any formal background in management training. Improving management skills of agricultural professionals is becoming widely recognized as a means of improving productivity in agriculture. For example, the International Agricultural Research Centers including IRRI and CIMMYT are now viewed as being limited in their impacts by management constraints and the thirteenth international research centre,the International Service for National Agricultural Research (ISNAR) has been created to address agricultural research management issues.

Many popular concepts of management exist: engineering time and motion analysis, management by objectives, management by exception, theory x and y, matrix management, functions of management (planning,organizing, directing, coordinating, control), etc. Another classification of management is based on business activity areas and appropriate tools of management control: financial management, human resource management, production control, inventory control, credit management, marketing management, environmental impact management, public relations management, farm management, agricultural research management, etc. As a discipline of study summarized in the University of Zimbabwe calendar, management is included in the Masters of Business Administration, Masters of Public Administration, and in farm management and agribusiness management courses in the Department of Agricultural Economics and Extension.

The definition of management, "The art of successfully pursuing desired results with the resources available to the organization." can be usefully applied to agricultural research management[1]. Downey and Trocke (p.21) define a manager as that person who provides the organization with leadership and who acts as a catalyst for change. Managers can be leaders, administrators, or "managers" depending on the extent to which new directions are pursued and achieved, significant new resources are obtained, staff are highly motivated and bosses are strongly supportive of the management unit activities.

A similar definition is cited by Bourrier for research management given by M.S. Swaminathan, former Director General of the InternationaL Rice Research Institute (IRRI) as, "The establishment of organizational objectives, the permanent monitoring of their validity, the identification and creation of opportunities for their achievement and the anticipation of problems associated with their definition and solution...(all) carried out through planning, organizing, directing, monitoring and controlling decisions."[2] Bourrier also

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[1]Downey, W.D and J.K. Trocke, Agribusiness Management, McGraw-Hill, Inc., 1981, p23

[2]Cited by G.R. Bourrier, Director, Fellowships and Awards, Division (IDRC) in Research Management Skills Workshop Manual, Edited by A. Loyns, J. MacMillan and E. Mupondwa, Department of Agricultural Economics, U of Manitoba, June 1990; Swaminathan, M.S. "Critical Elements in Managing Science and

notes that IDRC defines research management as covering, "all of the managerial skills necessary for the conduct of the business of a research establishment." It is suggested below that managerial skills for agricultural research managers focus on three major categories: 1) general management skills, 2) the skills required to translate limited agricultural research investment funds into the maximum benefits for farmers and 3) the skills required for analysis of the impacts of agricultural research on agricultural sector goals.

The departments of Agricultural Economics and Extension, University of Zimbabwe and Agricultural Economics and Farm Management, University of Manitoba are developing workshops designed to improve the level of expertise with respect to agricultural research management with financial assistance from the Canadian International Development Research Centre (IDRC). SADCC has identified agricultural research management training as an area requiring strengthening by means of a SACCAR/ISNAR agricultural research training project.

Objectives of the following paper are to:

-provide a brief summary of management concepts and functions

-describe application of these concepts to improving agricultural research management

-outline preliminary training needs assessment results in the area of: 1. general management skills and 2. determining agricultural research priorities within a commodity/industry framework.

2. FUNCTIONS OF MANAGEMENT

The five functions of management: planning, organizing, directing, coordinating and control provide a framework for assessing research management training needs. Consistent with this view of management all five functions are essential for successful management

2.1. PLANNING:

The concept of strategic planning has become popular in business, government and universities. Critical questions are developed with respect to defining appropriate clients for services and products, determining product and service mix, assessing strengths and weaknesses and developing strategies for achieving a long term mission for the organization.

Organizations without a plan are forced to continuously react to changing conditions rather than follow strategic responses to changing environments: economic, technological, social,and political. Planning involves the following steps: gathering facts, analysis, forecasting future environments, setting goals, developing alternatives, developing means of evaluating progress relative to goals.

Technology for Development", Proceedings of the Panel of Specialists of the United Nations Advisory Committee on Science and Technology for Development, January 8-11, 1983.

3.2 ORGANIZING

Organizing refers to the formal and informal responsibility and reporting relations between general functions such as marketing and production in a public or private entity. Such relations are often summarized in an organization chart. In matrix organisation structures specialist functions such as corporate planning and project management cut across the general functions in an organization chart. In addition the concept of organization can refer to alternative forms and combinations of public versus private organisational structures.

There are many forms of organization, private (incorporated, unincorporated, partnership, cooperative) or public (ministry, parastatal, board, government selling agency, and corporate structure with 51 percent government control). Each of the forms has advantages and disadvantages for different lines of business. Advantages and disadvantages for private sector organizations revolve around tax advantages, legal liability and potential for effective financial management. The perceived effectiveness in achieving country policy objectives appears to be the rationale for public control of organizations.

With the international move to decontrol of markets and privatization by governments it is very interesting to scrutinize the alternative organizational structures. For example, the Canadian Wheat Board is a government sales agency but it does not measure up to generally accepted measures of financial management and performance--the Canadian Auditor General continually criticizes the financial management of the Canadian Wheat Board. In contrast the Australian Wheat Board has similar objectives and is organized, run and financially managed more along the lines of a private corporation even though the objectives are much broader than the normal private corporation.

Many forms of organization exist in the agricultural sector of SADCC countries--which organizational forms incorporate sound principles of organization and financial management? Fortunately financial management concepts: profit and loss, balance sheet, flow of funds, and statement of equity are reasonably standard throughout most of the world except in communist countries such as the USSR and China where accounting concepts of profit and loss, are not widely used.

Many SADCC agricultural parastatals illustrate improving financial performance as documented in their annual reports. It is important to document organizational features of profitable as opposed to unprofitable parastatals.

2.3. DIRECTING:

Organizations receive directions consistent with many different decision rules. Dictatorial, unanimity, concensus, or majority decision rules are followed to varying degrees in different organizations. Surveys of large North American companies indicate a predominance of dictatorial decisionmaking by chief executive officers. In contrast, the Japanese style of management is closer to the unanimity form of decisionmaking which is receiving favourable reviews from many management analysts. Within organizations decision rules, lines of authority, delegation, accountability and responsibility need to be clearly defined to facilitate direction for all activities.

In the private sector managers commonly indicate that customer satisfaction is a critical guide directing all activities. In the public sector policymakers specify agricultural goals and policies as directives to public agricultural sector activities. However such directives are rarely translated into programs and as a result goals are rarely achieved effectively.

2.4. COORDINATING:

Communicating and motivating are critical co-ordinating tasks of managers. Individual discussions are often more effective than meetings in achieving coordination. Meetings if not efficiently organized can be a waste of time. According to one view meetings are best held to make group decisions on agenda items for which considerable prior individual and small group discussion has taken place to permit an informed decision. For all agenda items action and responsibility assignments should be recorded, noted in minutes and followed up at subsequent meetings. An alternative view is that meetings are strictly a social function and all important decisions are made independent of group input from meetings.

2.5. CONTROL:

In private sector organizations the level of success is a function of profits and return on invested equity capital. Many management tools are used to control activities to ensure "success". Tools of financial management including: cash flow, profit and loss, balance sheets, flow of funds and statement of equity exist. Performance evaluations of staff can be directly related to their contribution to profits.

In public sector organizations including universities, there is no well defined "bottom line" for measuring performance of organizations and often individual performance evaluations are nonexistent. Individual goalsetting and self-evaluation of annual performance relative to goals set at the beginning of a year can strengthen motivation and document personal achievements. Explicit documentation of individual achievements on an annual basis relative to goals and objectives is important for organizations because often individuals emphasize negative factors neglecting tangible positive accomplishments.

3. AGRICULTURAL RESEARCH MANAGEMENT

3.1 Required General Management Skills

What skills should a good farm manager have? Studies indicate that in addition to general management skills, surviving farm managers require highly developed cash management skills, debt management capabilities, commodity production and marketing abilities. With complete market decontrol government prices will be removed and market forecasting will be essential.

What skills and knowledge should a "good" agricultural research manager in SADCC have? What activities indicate that agricultural research management in SADCC is being practised at a "high" level? First, agricultural research managers need to have capabilities in areas of general management. Second, managers require a set of skills and knowledge concerning agricultural research. Agricultural research benefits can be translated into farm benefits in the context of farm management decisions and have positive impacts on country development goals..

General management skills and knowledge areas important for agricultural research include: 1) research planning and evaluation, 2) determining macro economic and agricultural sector research priorities (priority setting refers to the process of setting goals as a guide for allocating resources to research programs and projects), 3) financial management, 4) proposal and report writing, 5) human resource/personnel management 6) creating and co-ordinating research support systems, 7) other topics include: research station management (statistics, land use,plots, water use), running meetings, computer literacy, and time management.

The first four training topics were ranked most important by agricultural professionals (See Appendix A for questionnaire details)[3]. Research planning and evaluation was ranked as being the most important, followed by human resource management, macro¬economic and agricultural sector objectives and financial management. Scores were calculated by averaging the rank scores with the lowest score being the most important. Skills and knowledge appropriate for SADCC agricultural research managers relate to developing capabilities in relevant: 1) research strategies (broad goals such as "yield and quality" for plant breeding and "optimizing benefits relative to costs for all agricultural research projects", 2) project evaluation techniques, 3) communication, presentation, motivation and group dynamics skills, and 4) a knowledge base documenting SADCC"successes" and "failures" in agricultural research management as a guide for future improvements.

[3]Responses (13) have been obtained from members of the Crop Science Society of Zimbabwe, farm organizations, producer organizations, government researchers and international research center staff.

A research management workshop, financially supported by the Dept of Agricultural Economics and Extension and IDRC is being held at the University of Zimbabwe, to refine assessments of SADCC research management training needs and develop relevant case study materials.

3.2 Applying Capital Investment Criteria to Agricultural Research

It is suggested that "optimizing benefits relative to costs for agricultural research programs and projects" is an appropriate strategy for achieving successful agricultural research management in SADCC. Consistent with this strategy the key to effective agricultural research management is the evaluation of proposed research projects and programs, and the ongoing follow-up monitoring of results. In the private sector it is appropriate to consider investments in agricultural research as capital projects and subject projects to capital investment analysis procedures.

Expenditures on a plant breeding research project started to-day can be expected to continue for 5-6 years, or more and the expected benefits associated with commercial production may take 10-12 years to occur in terms of improved financial returns to farmers. Procedures exist for measuring the expected benefits relative to costs for plant breeding research projects.[4]

Investments in agricultural research by governments and universities require a broad assessment relative to public agricultural sector goals in addition to the evaluation of economic returns. Public sector objectives including: employment, impact on low income households, food security, and contribution to foreign exchange become important with respect to research financed by public funds.

Research stations and institutes can be considered as capital projects. Stations involve a major expenditure now with the expectation of future annual profits over operating expenses for farmers to be generated in the future--in other words a future stream of net profit for farmers is purchased with a capital expenditure now. Project evaluation is required to assess whether or not a capital project should be initiated with profits from prior years capital, raised through equity, debt or donor assistance. Capital expenditures should provide a return higher than is available from bank interest or the cost of borrowing for the project.

The simplest criterion is the "payback". Some entrepreneurs invest in projects which will return the total initial capital outlay from profits in a very short period of time ie., two years. Using the rule of 72--the number of years required for an initial investment to double--payback years can be calculated by dividing the rate of return into 72. This gives a rate of return of 36% for projects with a two year payback. More complicated analysis involves the

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[4]MacMillan,J., A. Kolody, A. Loyns, and P. McVetty, "Evaluating Producer Returns to WGRF Research Project Investments", Canadian Journal of Agricultural Economics 38 (1990) 123-36.

calculation of the present value of future benefits in relation to costs for a set of alternative research projects. With restraints on total research budgets or more realistically declining research budgets, research projects can be assessed and selected on the basis of investment criteria which include: benefit/cost ratios, net present values and internal rates of return.

3.3 Assessing Impacts of Agricultural Research on Agricultural Sector Development Goals

Projects with "high" benefit cost ratios can have "high" or "low" impacts on one or more agricultural sector development goals. Agricultural sector development goals normally include the following agricultural sector policy priorities: employment generation, household food security and nutrition, foreign exchange earnings, sustainability and environmental balance, and a focus on regional groups in need such as small farmers in drought prone areas. The Department of Research and Specialist Services in Zimbabwe has placed a "high" priority on research programs to benefit small communal farmers in drought prone areas. From an economic efficiency point of view investments of research funds in projects with a benefit/cost ratio less than 1 return fewer financial benefits to the drought prone farmers than the alternative of putting the research funds into a "savings fund" and distributing the annual interest earnings to the farmers. In this case a reasonable research project investment criterion might be to invest in all projects with benefit/cost ratios greater than 1 which have an impact on improving incomes of small farmers in drought prone areas. The SADCC/ICRISAT Sorghum Millet Improvement Program (SMIP) may include research projects which meet this criteria. Also, the International Maize and Wheat Improvement Center (CIMMYT) research projects for rainfed maize in drought prone environments may be able to meet the positive B/C ratio with positive impacts on the agricultural sector development criterion.

With respect to national food security it may be preferable to invest in "high" B/C maize research projects for small communal farmers in high rainfall areas of Zimbabwe and transport excess production to communal maize deficit production areas. Another alternative is to promote "high" B/C research projects for drought resistant cash crops such as cotton and tobacco in small farm communal areas which are drought prone. In the case of cotton and tobacco crops for small farmers in drought prone areas it may be possible to have a "high" B/C ratio for research projects and also have very positive impacts on other agricultural sector goals including impacts on household food security and foreign exchange earnings. Consistent with this approach Eicher suggests that a cotton study would generate data to show household food security is higher on farms growing cotton than surrounding farms producing maize/sorghum and groundnuts.[5] A further selection of projects based on "high" impacts on sustainability and conservation policy goals could be used to carry out an

[5] Eicher, C.K., "Agricultural Research Priority-Setting in Southern Africa: Nutrition and Household Food Security", M. Rukuni and J.B. Wyckoff, eds., Market Reforms, Research Policies and SADCC Food Security, p232, UZ/MSU Food Security In Africa Project, Department of Agricultural, Economics and Extension, May 1991.

additional selection of proposed or ongoing agricultural research projects for additional funding.

4. AGRICULTURAL RESEARCH MANAGEMENT TRAINING NEEDS

An assessment of Agricultural research training needs consistent with the general management framework outlined above would address the following questions:

-what is the best planning framework?
-what is the best organization?
-what is the best format for directing, coordinating and control?

In addition, development of appropriate case studies and materials is critical.

4.1. PLANNING

Evaluation of the benefits associated with alternative research projects in relation to project costs is required to develop an appropriate research strategy. There are two important groups of farmers in SADCC benefiting from research: large scale commercial farmers and small communal farmers. SADCC countries have placed a high priority on research to benefit small scale farmers. An appropriate agricultural research strategy would assess the potential impact of investments in agricultural research projects on a commodity/industry basis and provide information on financial and economic returns to both small and large commercial farmers and agribusiness.

Applying benefit/cost analysis to the Zambia-Canada Wheat project in Zambia in a 1987 review it became clear that without redirection of the project to achieve benefits from production by small farmers the project would be a failure as an economic investment. The project had developed very high yielding rainfed wheat varieties but had not initiated projects to ensure production by small farmers. Subsequent to the review the project has now targeted 5000 small farmers as likely project beneficiaries.[6]

In benefit/cost analysis applied to agricultural research the issue is--will the likely benefits be greater than the costs. Applying the concept to projects before they are initiated can lead to project improvements. Instituting ongoing follow-up monitoring of the benefits in relation to costs will also promote greater efficiency in the use of agricultural research funds.

4.2. ORGANIZING

Organizing agricultural research refers to the formal and informal relations between research and specialist functions including planning, priority setting, finance and operation of research institutes and stations. At the project level, for large agricultural research

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[6]Personal communication with B. Proud, Team Leader, Zambia-Canada Development Project, April 1991.

projects, the organizational structure defining relations between research specialists and project managers is ofen defined in a project management organisation chart.

Impacts of alternative research projects can best be evaluated on a commodity/industry basis. Discussions with agricultural scientists indicate that unique commodity organizational characteristics exist. Research on cotton and tobacco breeding, which are export cash crops, are subject to a very different adoption process than maize, a domestic food crop. For example, only two cotton varieties are legislated for Zimbabwe whereas alternative maize varieties are promoted by private companies and the Seed Coop. The benefits of high yielding varieties developed by the Cotton Research Institute are not subject to competition from international companies. In contrast, research benefits from new maize varieties by private companies are not restricted to Zimbabwe but benefits can result from a Southern African adoption process.

Research on the Sorghum Millet Improvement Program (SMIP) by SADCC/ICRISAT depends on a very loose organization of National Agricultural Research systems to provide local information on the potential for new Sorghum and Millet varieties.[7] In contrast, Shumba concludes there is uncertainty by seed producers regarding the extent to which the SMIP varieties will be adopted because of farmers preferences for producing and consuming maize.[8]

According to Shumba, agricultural research priority setting in Zimbabwe has traditionally focussed on national food self sufficiency and promotion of export crops. After independence in 1980, new programmes have been concentrating on cowpea and bambaranut breeding and agronomy programmes for small grains, oilseeds, horticulture and production systems for small communal farmers in drought prone areas.

What are the most important research projects by commodity group including: maize, cotton, wheat, oilseeds, sorghum & millet, agroforestry,and livestock. The following groups of research projects are suggested as a general framework for developing research project priorities on a commodity/industry basis:

1. breeding (new varieties of crops and livestock breeds)
2. sustainability and conservation tillage
3. input packages to communal producers
4. household food security contributions of cash income/subsistence
5. farm financial returns

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[7]House, L.R. and D. Rohrbach, "The Experience of SADCC/ICRISAT in Setting Priorities for Sorghum and Millet Research for Household Food Security", M. Rukuni & J.B. Wyckoff, Market Reforms Research Policies and SADCC Food Security, p 263.

[8]Shumba, E., Zimbabwe's Experience in Agricultural Research Priority Setting for Communal Area Households", M. Rukuni & J.B. Wyckoff Market Reforms, Research Policies and SADCC Food Security, P 290.

6. farm economic returns (without subsidies)
7. on farm research
8. market development and comparative advantage
9. food security contributions of processed products
10. policy analysis: impacts of market decontrol and privatisation

Information on the most important research project areas by commodity is essential to developing a research strategy for individual commodity/industry groups. A common framework across commodities is required to provide a consistent aggregation of research project priorities across commodity groups.

The research topics listed in the questionnaire are more broadly focussed than the CIMMYT list of future research needs for rainfed maize in drought prone environments: rainfall distribution, germplasm, plant population density, soil fertility and water holding capacity, planting date, ridging, weeding, soil insects, crop-livestock interactions, economic evaluation and adoption studies[9]. It is interesting to note that Waddington indicates an urgency for economic analysis of the benefits to farmers of new technology but the analysis of expected economic benefit versus costs as a screening tool for selecting alternative technology research projects is not suggested.

A large majority of agricultural scientists indicated a high priority for policy analysis research on the impacts of private sector pricing and exports. In contrast, communal maize producers indicate that they expect privatization of maize marketing would result in increased fertilizer and other input prices and not much change in farmgate maize prices. Tobacco is marketed under a private sector auction marketing system and indications are that research on farm returns without government subsidies would provide useful information.

It is interesting that across a broad range of agricultural research scientists, breeding (new varieties) received the top priority as a research topic. Sustainability and conservation tillage, farm financial returns and farm economic returns without subsidies were ranked as a second priority group of research topics. Other topics in decreasing rank order of importance are: policy analysis, on farm research, market development, input packages to communal farmers, and food security of cash income/subsistence and processed products.

With market decontrol market research for farmers and agribusiness will become increasingly important. For example, in Canada, grain co-operatives are providing 11 alternative marketing options to farmers based on time of delivery options, alternative current or future prices based on commodity futures options traded on commodity futures

[9]Waddington, S and P. Kunejeku, "Potential Technology for Rainfed Maize Production in Drought Prone Environments of Southern Africa", Farming Systems Bulletin, Eastern and Southern Africa, No. 3., 1989, CIMMYT, Harare, pp 28-41.

exchanges. Returns to good marketing decisions by farmers will be very high in a completely decontrolled market.

4.3. DIRECTING

Directions need to be solicited from farmers (small scale and commercial) who are the primary beneficiaries of agricultural research. Agribusiness benefits generate employment and value added activity to the extent that new markets are associated with successful research projects.

4.4. COORDINATING

With respect to agricultural research there is potential for all researchers to benefit from more communication with respect to effective research management techniques, as well as successes and failures in different countries. The mechanisms which Zimbabwe and Zambia are using to increase production by small scale farmers need to be assessed relative to the potential for success in other SADCC countries. Research reports need to provide results in a format which readily communicates the importance of the research to governments, farmers and agribusiness.

4.5. CONTROL

A strong case can be made for greater public participation and control in the evaluation of agricultural research financed by public funds. Farmers and agribusiness should have a major role in determining which agricultural research projects are undertaken on the basis of research project proposals and expected benefits in relation to the costs of research. It may be possible to increase farmer and agribusiness participation in agricultural research institute programs now financed with decreasing government funds. Increasing research could be financed with funds solicited by means of commodity sales revenue levies from farmer and agribusiness beneficiaries. According to Shumba an increasing share of marketed maize output is from communal farmers--8 percent in 1976-80 and 48 percent in 1986-88 and for cotton communal farm production increased from 22 percent to 56 percent over the same period. With funds generated from a maize and cotton sales revenue levies at the farmgate--communal farmers could become major research supporters and increase their participation in maize and cotton research on a commodity/industry basis.

Benefit/cost analysis can be used for agricultural research management control purposes[11]. For example, the feasibility of estimating benefits and costs of ongoing Agricultural Research Trust (ART) Farm and AGRITEX research and demonstration activities in four communal areas suitable for intensive farming due to the moderately high rainfall (750-1000

[11]See MacMillan, J.A., Mudimu G., Rugube L., and Guveya E., Micro-Computer Ex Ante Small Farm Agricultural Research benefit/cost analysis, Department of Agricultural, Economics and Extension, Working Paper, June 1991.

mm) is being explored[12]. Estimation of expected benefits relative to costs can be used the same way a budget forecast is used in financial management--as a guideline measure for expected performance. In this case the ART farm and AGRITEX activities are considered as an incremental investment relative to the breeding research carried out by the Seed Coop and commercial companies.

In addition, the feasibility of using benefit/cost analysis as a screening criterion for proposed research and demonstration activities in communal farm communities is also being explored. Benefit/cost analysis can be used to rank expected benefits relative to costs for proposed research and demonstration projects such as commodity and cultivate selection (maize, soyabean and groundnuts), fertilizer trials, time of planting and spacing, conservation tillage, etc. In this way only activities with a high expected pay off will be initiated and expected performance measures will be defined for research and extension activities.

Similarly benefits and costs of the SADCC/ICRISAT Sorghum and Millet Improvement Program (See Appendix B) and the Cotton Research Institute research (See Appendix C) could be assessed relative to increasing net financial returns of commercial and communal farmers, as well as value added in the processing sector.

5. CONCLUSIONS

With the increasing scarcity of public funds for agricultural research--agricultural research as a percentage of GDP is falling--pressure is being placed on research managers to justify their expenditures. Budget reductions are resulting in reduced farm demonstrations and inappropriate combinations of researchers/technicians. The research strategy of "yield and quality" has been successful for many agricultural research institutes in the past. Research institutes in SADCC could improve their performance by selecting alternative research programs and projects using benefit/cost criteria. Increasing returns to research can result from assessing benefits in relation to costs of alternative research projects. As part of the benefit assessment impacts of alternative agricultural research projects on agricultural sectoral development goals can be estimated. Benefit measures need to be established for small and large commercial farmer groups on a commodity basis.

The questionnaire results indicate that general management training needs for agricultural research managers ranked in descending order of importance are:

1. research planning and evaluation,
2. human resource management and development,
3. macro-economic and agricultural sector objectives
4. financial management
5. proposal and report writing

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[12]See J. MacMillan, G. Mudimu, J. MacRobert, L. Rugube, E. Guveya, L. Mutemeri and K. Chakanyuka, "B/C Analysis of Communal Farm Research and demonstrations, Zimbabwe, Department of Agriculture Economics and Extension, Working Paper, July, 1991.

6. management information systems
7. research support systems
8. case studies of management
9. others: research station management, running meetings, and
10. Gender sensitive approaches to management.

Research problems were ranked across commodity/industry groups in descending order of importance:

1. breeding
2. sustainability and conservation tillage
3. farm economic returns without subsidies
4. farm financial returns
5. policy analysis: private sector pricing and increase in exports
6. on farm research
7. market development and comparative advantage
8. input packages to communal producers
9. food security contributions of processed products, and
10. household food security contributions of cash income/subsistence crops.

Benefit/cost analysis of research projects can be structured to include the first four research problem categories. The other categories relate to agricultural sector development goals and require analysis separate from benefit/cost analysis.

APPENDIX A: QUESTIONNAIRE

UNIVERSITY OF ZIMBABWE:DEPARTMENT OF AGRICULTURAL ECONOMICS.

QUESTIONNAIRE ON RESEARCH MANAGEMENT TRAINING NEEDS AND COMMODITY RESEARCH PRIORITIES.

Name of person interviewed :_____

Organisation:_____ Date:_____

Address:_____ _____

_____ _____ Tel.:_____Name of interviewer:_

_____Commodity :_____

** Please answer all questions with: a). a rank number b). yes(1), no(2), dont know (Dn)(3), or no response(NR)(4).

I.RESEARCH MANAGEMENT TRAINING NEEDS.

A. INTRODUCTION.

While agricultural research needs are many ,manpower and financial resources are scarce.For efficient allocation of these scarce resources there is a need for adequate agricultural research management training.Optimum allocation has to be made of research projects and programmes as they have short- and long-term implications on financial and human resouce allocation and attainment of a given set of objectives.There is therefore a need to strengthen the scientific and institutional capacity of National Agricultural Research Systems,and one such strategy involves the development and strengthening of the managerial capacity of research systems managers.

The objective of this questionnaire is to identify areas where agricultural scientists have the greatest need for management training.

B. TRAINING NEEDS.

1.What training would be needed for an effective research manager?

2.What training would be needed for an effective researcher?

3.Please rank the following suggested research topics according to their relative importance to research management training needs.(rank 1-10 ,1 being the most important).

1.Macro-economic and agricultural sector objectives and implications for agricultural research.

2.Research planning and evaluation.

3.Financial management.

4.Human resource management and development.

5.Management Information Systems for research management.

6.Strategies for building scientific capabilities:proposal and report writing.

7.Creating and co-odinating research support systems.

8.Gender sensative approaches to management.

9.Case studies of management problems and approaches.
10.Others:Research station management,running meetings,

II.COMMODITY RESEARCH PRIORITIES.

A. INTRODUCTION

The following questionnaire is being designed to obtain basic data required to improve the organization of agricultural research.
Data is needed for analysing expected benefits and costs, as well as contributions of research to country and regional economic development goals.

The primary objective is to establish on a commodity basis:1). a list of problems identified by producers,marketing,government,and university staff 2).sketch appropriate research projects including:project staff,time schedules,and budgets,as well as the time path of expected benefits and links to development goals.

A secondary objective is to prepare a framework and process for developing a research strategy for commodities which could be used to solicit financial support for research from commodity producers,marketing and government agencies as well as donors.It is felt that there is an urgent need for commodity sector research to indicate the best means of increasing foreign exchange earnings,employment, farm income for communal and commercial producers,food security and sustainability of contributions to the Zimbabwean economy .

B. ECONOMICS OF PRODUCTION

1. Are reasonable financial gross margins feasible with 1991 expected floor prices for commodity_____:
   a).commercial farmers Yes___ No___ Dont know___
   b).communal farmers Yes___ No____ Dont know___
   (Analyse available farm budget information)

2. Do reasonable financial returns exist given: (i) unsubsidised prices for inputs(labour,fertilizer,chemicals,transportation and storage) for:
   a).commercial farmers? Yes ___ No___ Dont know____
   b).communal farmers? Yes_____ No___ Dont know____ (ii)world market prices for:
   a).commercial farmers Yes ___ No ___ Dont know ___
   b).communal farmers Yes ___ No ___ Dont know ___
   (Analysis of farm budgets, as well as the international market prices, with unsubsidised inputs - shadow prices is required.

3. Comment on the accessibility to the following farm inputs:
*Rank 1.good 2.fair 3.poor 4.no comment.
a).fertilizer ___commercial _____communal
b).labour ___ _____
c).chemicals ___ _____
d).credit ___ _____
e).transport and storage ___commercial _____communal
f).Irrigation ___commercial _____communal
g).others (specify).

4. With the increased accessibility to farm inputs in B.3 is the level of farm income on communal farms likely to increase substantially? Yes ___ No ___.
Dont know ___

5. Is the potential for increased production from new varieties/hybrids high? Yes ___
No _____ Dont know ____

6. What other critical production problems exist for:
a).communal farms?
b).commercial farms?

7. What research is going on to answer the above mentioned problems?
a).communal farms
b).commercial farms

C.MARKET DEVELOPMENT,PROCESSING AND REGIONAL COMPARATIVE ADVANTAGE

1. Are positive financial returns feasible in the processing industry without subsidies?
Yes ____ No ____ Dont know ___

2. Is the processing industry a high (i) employment generating industry? Yes ___
No ___ Dont know ___
(ii)income generating industry? Yes ___ No ___ Dont know ___

D.SUSTAINABILITY and FOOD SECURITY.

1. Is it possible to maintain high yields under conventional tillage? Yes ___ No ___
Dont know ____

2. Is conservation tillage a potential improvement over conventional tillage practices?
Yes ___ No _____ Dont know _____

3. Is it possible to maintain high production given current production costs and producer prices?
Yes ___ No ___ Dont know ___

4. Is the contribution of production to household food security for communal producers high? Yes ___ No ___ Dont know ____

5. Is the contribution to national food security:
(i). oil high? Yes ___ No ___ Dont know ___
(ii).livestock feed high? Yes ___ No ___ Dont know ___

E.POLICY ANALYSIS.

1. Are the impacts of a change in pricing policy from government determined producer and input prices to free market determined prices positive?
Yes ___ No ___ Dont know ___

2. Are the impacts of increasing commodity exports on foreign currency earnings positive? Yes ___ No ___ Dont know ___

3. Suggest other policy scenarios.

F.SUGGESTED RESEARCH TOPICS.

1.Rank critical research topics for commodity_____..
2). Please rank the following suggested research topics relative to their potential for increasing commodity production in Zimbabwe.(Rank 1-10,1 being the most important.

Research topics	RANK
1.Breeding(new varieties).	
2.Sustainability and conservation tillage.	
3.Input packages to communal producers.	
4.Household food security contributions of cash income/subsistance.	
5.Farm financial returns	
6.Farm economic returns (without subsidies)	
7.On Farm Research.	
8.Market development and comparative advantage.	
9.Food security contributions of processed products.	
10.Policy analysis: Private sector pricing and increase in exports	

3).To which crop do you think research should be emphasised. Rank the crops 1-4,1 being the most important crop.

a).maize ____
b).wheat ____
c).cotton ____
d).tobacco____

G.AVAILABLE RESEARCH.

List in order of importance:(i). research projects/programs in progress. (ii).expected research projects/programs.

END OF QUESTIONNAIRE.

APPENDIX B: PROPOSED OUTLINE FOR ESTIMATING IMPACTS OF SMIP RESEARCH

1. Benefits of Impact Research

In the current environment of decreasing funds for agricultural research, staff turnover and generally decreasing research resources it is important to focus on the potential benefits of initiating research on quantifying the benefits of research. Our hypothesis is that policymakers have not been convinced that the potential benefits of additional agricultural research funds outweigh the potential benefits of public expenditures on competing needs in health, education, business development, etc. The broad goals of this research are to: 1) estimate quantitatively in terms understandable to policy decisionmakers the impacts of agricultural research, 2) provide information which can be used by research decisionmakers in annual selections of research projects and programs to facilitate increasing the overall benefits achieved by researchers, 3) emphasize the contributions of agricultural research to country economic development goals including: economic growth, food security, employment and income improvement for small scale farmers, and 4) indicate the potential for "privatizing agricultural research by quantifying expected benefits from research projects and programs.

2. Approach

The approach used in Manitoba research evaluating Producer Returns to WGRF project investments can be modified and applied to SMIP research projects. In our Manitoba research we worked on estimating impacts of a research project on breeding improved hybrid canola varieties in collaboration with a plant breeder. The basic approach would be to define SMIP projects with a range of expected target benefits occuring over a future time period. Alternative benefit scenarios are required for alternative weather, international price cycles, and country agricultural policy options.

A similar procedure is used on an annual basis by international energy companies to maximize the pay-off from a list of proposed oil well exploration and development projects with a fixed budget using capital investment criteria to select the preferred package of projects. The framework proposed could provide a basis for "privatizing" packages of high pay-off research projects. If the benefits of agricultural research are as high as many studies indicate it should be possible to design an institutional capacity to create and capture such benefits. In the extreme it should be possible to sell share capital to farm organizations (large and small based on levies on commodity revenues), agribusinesses and the public. Research is required to demonstrate that "profits/dividends" can accrue to investing groups. In addition, country finance departments are requiring that all requests for public funds document the contribution expected to country development goals generated by the expenditure.

The benefits would be defined in collaboration with SADCC/ICRISAT research staff. The benefits would then be compared with project costs. If the impact research is successful it should then be possible to use the results to re-orient projects to particular areas to increase the magnitude of the resulting benefits per $1 million dollars research expenditure. Appropriate definitions of benefits can be made consistent with the "improvement of crops for the poor farmers living and working in areas of low productivity...".

3. Research Tasks

The first task would be to define appropriate benefit measures and a framework for analysis with you and your staff. The framework would explicitly deal with the definition of research projects with expected target yield increments relative to incremental breeding, agronomy and pathology research inputs. Incremental research and demonstration costs occur over the 1984-94 period in the SADCC/ICRISAT program and in NARS. The project costs are considered on a marginal or incremental basis relative to the overhead or infrastructure cost of the total program. Training and station facility investments would be separated from the $42 million 1984-94 total program budget and included in the analysis on a descriptive basis.

The second task involves estimating the time path of expected target yield impacts and total hectares associated with new variety production by small farmers on a SADCC country basis. Projects could be defined on a variety basis for Sorghum, Pearl Millet, Finger Millet and forage varieties (Banagrass and Pearl Millet). Benefits are expected to occur from small farmers switching to advanced varieties from current low yielding sorghum, millet, maize and forage crops. The potential for such benefits is suggested by D. Rohrbach et. al. "Agricultural Growth and Food Insecurity", p114, In Integrating Food, nutrition and Agricultural Policy in Zimbabwe, UZ/MSU Food Security Project Proceedings, 1990. Estimates of benefits involve farm financial and economy (without subsidies and import parity pricing) calculations, as well as foreign exchange impact calculations. Impacts on a country macro-economic objectives such as food security and employment can also be analyzed. A comparison of farm financial benefits with economic benefits provide an upper estimate of the benefits associated with producer prices set on an import parity basis. For informal local markets product prices need to be estimated for alternative consumer uses.

A third major task involves estimating additional benefits resulting from additional value added and employment in related agribusiness and processing activities stimulated by the SMIP research activities. This category of benefits can be referred to as post harvest or post production benefits of agricultural
research. Categories of incremental agribusiness and processing
benefits include: 1) seed production, Zambia and Zimbabwe, 2) substitution of sorghum flour for wheat in bread, rolls, biscuits and pasta in Zimbabwe, 3) weaning food in Botswana made from sorghum and soya bean flour, 4) use of sweet stemmed sorghum to substitute for sugar cane in the production of fuel ethanol by Triangle Estates in Zimbabwe due to the benefits of a saving of one third the water input, and 5) use of advanced malting sorghum

varieties in the production of Chibuku.

Fourth, a detailed research proposal would be prepared in collaboration with your staff documenting: expected benefits, research objectives, method of analysis, data requirements, time schedule of tasks defined by manday, personnel assignments, budget requirements and expected products in terms of training, research reports, journal articles, theses and institutional capacity development.

Source: personal communication with Dr. L. House, Executive Director, SADCC/ICRISAT, Bulawayo, Feb. 26, 1991 by J.A. MacMillan

APPENDIX C: Draft Proposal: Economic Impacts of Additional Cotton Research

Rationale: -cotton research is underfunded relative to the potential economic benefits
Method:-review ongoing projects of the Cotton Research Institute and select projects with a potential for high economic returns if the projects were expanded
-select high pay-off research projects to make up a total budget for proposed additional projects of $100 thousand
-review projects in 4 research programs: agronomy/physiology, breeding, entomology, and pathology
Data required: Annual research reports appear to have sufficient information on yield impacts over several years associated with
ongoing trial results to permit estimation of target yields for sucessful research and economic benefits versus costs of expanding specific projects
-experimental data requires supplementation with farm financial and economic costs of production, prices: export and domestic, transport costs, subsidies, etc.
-research project cost estimates, proposed annual budgets and probability of success in achieving estimated target yields are required
-value added income, benefits of further processing beyond the cotton production stage and employment benefits associated with additional processing associated with additional yield and area can also be estimated given the current excess capacity in the ginning plants
Projects with Potential High Economic Returns if Expanded based on a PRELIMINARY Analysis of the 1986/87 Annual Report,Cotton Research Institute, DRSS
1) sowing date and spacing: potential 550 kg/ha incremental yield for .75 metre row and .15 within row spacing when planting Nov. 19 instead of Dec 3 with G501 variety and 282kg/ha with the HA1 short season variet at the Cotton Research Institute, p. 14. Spacing trials at Chiredzi,p.24, Chisumbanje,p27, and communal areas will likely have high pay-off. Sowing dates earlier than Nov. 19 with conservation tillage may also have a high economic return.
2) moisture conservation: potental up to 160 kg/ha based on commercial research station trials for bed and pothole, p.33 and communal area ridge and cross tie trials,up to 811 kg/ha,p.37 3) communal area fertilizer trials: potential yield increases, p37 can be translated into $ returns for communal farms
4) breeding: potential for 7% increase with current varieties under trial for commercial farms and 14% for communal area production (CRI discussion, Jan 21); very high potential yield increases, 46% are indicated for a new long staple variety under trial in communal production, p. 100. Estimates of the potential economic returns created by the introduction of the new varieties Albar K502 and 603 can be made.
5) Pathology: trials were initiated to determine the yield impact of pathology experiments, p.216; these trials could be expanded to establish target yields for pathology research projects
6) Entomology: need to initiate trials to establish potential yield impact for pest research projects

Source: personal communication with Dr.G.G. Rabey, Head, Cotton Research Institute, Kadoma, Zimbabwe, Jan 23, 1991 by J.A. MacMillan